NASA TT F-11,428

NASA TT F-11,428

HISTORY OF AVIATION AND COSMONAUTICS, VOL. II

N. D. Anoshchenko, Ed.

Translation of "Iz istorii aviatsii i kosmonavtiki, Vyp. 2." USSR Academy of Sciences. Soviet National Association of Historians of Natural Science and Technology, Moscow, 1964.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546 NOVEMBER 1967

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*NASA editorial note: Only a summary of this Russian article is presented here due to the fact that histories on the development of rocket boosters are available in English.

HISTORY OF AVIATION AND COSMONAUTICS, VOL. II

Brief History on the Development of Rocket Boosters in the USA

I. N. Bubnov

[Summary of Pages 3-55]

A brief summary of the development of space launch vehicles in the USA is presented. The early history of very large ballistic rockets in the USA, such as the V-2 and the Viking, is presented, followed by a description of the development of rockets in the USA, such as the Atlas and Titan I. A detailed description of these rockets is given, including such characteristics as fuel weight, length, maximum frame diameter, fuel, operational time of the engine, maximum velocity, etc.

The expansion of the USA space program is then discussed, with a description of the functions of NASA within the framework of this program. In 1960 the United States developed a special space vehicle called "Scout" for use in the launching of satellites. A light rocket was needed to launch small satellites weighing up to 100 kg. A detailed table presents basic data on the US space vehicles used at the present time, including "Thor-Agena A", "Thor-Delta", "Atlas Agena", "Scout", "Titan 2", "Saturn I", etc.

It is stated that one general feature of the development of US space launch vehicles is that a single form is used successively on different vehicles. Thus, the construction of the V-2 rocket was subsequently modified and used on the rockets "Viking", "Jupiter", "Thor", "Atlas" and, finally, "Saturn I". The stages of the first "Vanguard" launch vehicle were subsequently used on the rockets "Atlas-Able", "Thor-Delta", etc.

One great achievement of American rocket construction is the successful use of liquid hydrogen as the fuel in the upper stages. Three successful tests ("Atlas-Centaur" and "Saturn I") point to the future use of hydrogen as a fuel.

The launch vehicle having the greatest reliability (91.5% as of January 1, 1964) is "Thor-Delta". "Thor-Agena" has a reliability of 77.5%, and "Atlas-Agena" -- 77.1%.

Only recently have the American efforts been concentrated in certain basic directions, and there has been a tendency towards unification. This has led to excellent results (success of the "Saturn" program). It is emphasized that the development of US launch vehicles has been based for a long period of time on medium- and long-range ballistic rockets. To a significant extent, this has retarded the progress of space research in the USA due to the low load capacity and low reliability of ballistic rockets. At the same time, the low load capacity of space vehicles has stimulated the production of small and relatively light satellites.

Prehistory of Soviet Gliding*

N. D. Anoshchenko

The Soviet Union recently noted the 40th anniversary of Soviet gliding. /56**

* A report given on December 2, 1963 at the 57th meeting of the Aviation Section of the Soviet National Society of Historians of Natural Science and Technology.

** Numbers in the margin indicate pagination in the original foreign text.

Gliding began with the First All-Union Gliding Tests in the Crimea conducted in 1923 by the Society of Friends of the Air Fleet of the Soviet Union (ODVF SSR). Therefore, we would like to pay our respects to the memory of the Russian scientists and inventors who in the past have by their labors blazed trails in the development of gliding and modern aviation. We should remember that the first heavier-than-air flying machine in which man was able to tear himself from the earth and fly was a glider.

N. A. Arendt (1833-1893), a doctor of medicine, in his article "A Contribution to the Problem of Aerial Navigation. On Gliding Flight", published in the journal Znaniye in 1873, was the first in Russia to propose a motorless apparatus with fixed wings for gliding and soaring flight, using for this purpose only the energy of the oncoming stream of air. Arendt supported his views with numerous experiments in launching paper models of gliders and frozen birds of different species, and in 1888 he published in Simferopol' his work "On Aerial Navigation Based on the Principle of Soaring by Birds. On Gliding Flight." It should be noted that Arendt also was the first to advance the idea of establishing a surface trainer for preliminary instruction in flights on gliders.

Since the material, published in the collection of documents in the archives "Aeronautics and Aviation in Russia Before 1907", presents a sufficiently comprehensive description of Arendt's work, we consider it superfluous to repeat this. Let us merely indicate that this material corroborates the assertion that Arendt /57 is one of the founders of Russian gliding and of the science of soaring flight.

The creator of the first airplane with a steam engine, A. F. Mozhayskiy, as early as 1876 constructed and personally tested in flight large aerial kites which he launched on a rope. This compels the author to consider A. F. Mozhayskiy the first man in Russian to go up in towed gliders.

A great role in the birth of modern aviation was played by Otto Lilienthal, who in 1891-1896 constructed several monoplane and biplane catapult gliders. In them, Lilienthal made about two thousand gliding flights from a hill and launching tower which he built especially in Lichtenfeld. These flights of Lilienthal's and his book The Flight of Birds as the Basis of Flying, which was translated into many languages, including Russian, played a substantial role in popularizing aviation and gliding ideas.

"The Father of Russian Aviation," Professor N. Ye. Zhukovskiy, whom we may now with complete justification consider also the "Father of Russian Gliding," was deeply interested in Lilienthal's experiments, and in 1895 during a journey abroad was present at his flights.

As is known, Zhukovskiy as early as 1877 began to conduct preliminary experiments on the study of bird flight and a series of experiments to determine the basic laws of aerodynamics. In 1891, as though in response to the reproach by Arendt that scientists were quite unable to give a mathematical foundation for bird flight, he made his noted report "On the Soaring of Birds," in which he made a profound study of, and provided a theoretically correct explanation for, the principle underlying the soaring flight of birds and predicted the possibility of performing the loop and other figures of aerobatics in gliders and future airplanes.

When visiting Lilienthal, Zhukovskiy for the first time saw a man in the air flying on artificial immobile wings, i.e., in a glider, and thus giving a practical demonstration that the creation of lighter-than-air flying machines was completely possible and that his, Zhukovskiy's, theoretical computations were not at variance with practice.

Even after the tragic death of Lilienthal, when in practically all countries glider flights were at a standstill, Zhukovskiy, speaking on August 25, 1898 at the Tenth Congress of Natural Scientists and Physicians in Kiev, said, "I think that the manner of investigating the problem of aeronautics by means of a soaring flying machine (i.e., a glider--the author) is one of the most reliable. It /58
is simpler to add a motor to a well-studied gliding flying machine than to enter a machine which has never flown with a man."*

Believing that the building of gliders and that flights in them were the needed school for future aviators and designers of heavier-than-air flying machines, Zhukovskiy organized in Moscow the "Circle of Gliding Experimenters," in the work of which Zhukovskiy's comrade -- the scientist and aviator, S. S. Nezhdanovskiy -- also took a most active part. Nezhdanovskiy was the first to give a theoretical and practical demonstration in his glider models that longitudinal stability in a flying machine requires an immobile stabilizer plane and that increase in transverse stability requires a certain "V" wing. This was his essential contribution in developing the design of future airplanes and gliders.

In 1908-1909, Zhukovskiy initiated the foundation of the first student gliding clubs in Russia ("Aeronautics Club of Moscow Technical University" and the similar club in the Moscow State University). The members of these clubs included such major scientists and designers as the Academicians A. N. Tupolev, and B. N. Yur'yev, Professors V. G. Vetchinkin, K. A. Ushakov, G. Kh. Sabinin, and V. A. Slesarev, and many other figures in aviation science and engineering.

Similar clubs were also organized in other cities (in Kiev -- the club of Professor N. B. Delone in the Polytechnical Institute, from which came such designers as D. P. Grigorovich, I. I. Sikorskiy, A. A. Fal'ts-Feyn, and others; in St. Petersburg the club of N. A. Rynin in the Institute of Communications Engineers, etc.), the members of which also played a major role in the development of domestic aviation in our country and of its science and engineering.

In completing this brief survey of the pre-revolutionary period, we must still speak of the first glider and soaring pilot in Russia, since a distinctive feature of Soviet gliding is his mastery of precisely those soaring flights about which Arendt and Zhukovskiy wrote.

In 1911 a report appeared in the press that the Wright Brothers had again /59
returned to gliding in order to create a device capable of performing soaring flights, and that during the last experiments in the Kitty Hawk, Orville Wright had succeeded in remaining on their motorless machine for 9 min., 45 sec.

In the following year, our amateur glider pilot, S. P. Dobrovol'skiy, decided

* N. Ye. Zhukovskiy. Sobraniye sochineniy (Collected Works), Vol. VII, Moscow-Leningrad, p. 26, 1950.

to repeat their experiments in his village of Agaymany, Taurida (Tavricheskaya Guberniya), and in a strong autumn wind, he was the first in Russia to make a series of successful soaring flights over the steppe, lasting at times more than five minutes.

Deprived of its needed support, however, gliding in Russia had gone into a decline by the beginning of the First World War. Only the Great October Revolution, which unchained the creative forces of the nation, created all of the prerequisites for the development of gliding among us.

The most important factor in the prehistory of Soviet gliding is in our opinion the organization of the special "Aero-Workshop Gliding Class" in the "Flight Laboratory" -- that first scientific research institution of the Air Force, created by Soviet power in 1918.

In 1919 the reorganization of the "Flight Laboratory" occurred, founded by the aviator B. I. Rossinskiy, and the Scientific Board under the chairmanship of N. Ye. Zhukovskiy, in which the author was appointed a Board member, became its head. In the spring of 1919, he developed a plan for creating an "Aero-Workshop" with a gliding class designed to "study the elements involved in a theory of constructing motorless aeroplanes (i.e., gliders) and flights on them" in the "Flight Laboratory."*

The project was supported by N. Ye. Zhukovskiy, B. I. Rossinskiy, V. P. Vetchinkin, and other members of the Board, and on May 25, 1919, by Decree No. 16 of the "Flight Laboratory", the creation of an "Aero-Workshop" and of a special "Gliding Class" was announced. This was the beginning of the development of modern Soviet gliding and the historic link connecting the past of Russian gliding to the present day of Soviet soarers.

On September 7, 1919, in an empty room of the summer restaurant "Mavritaniya" in Petrovskiy Park, the "Gliding Class" was opened at which N. Ye. Zhukovskiy -- that founder of gliding in our country -- gave a lecture on the history of gliding; therefore, we consider this date to be the beginning of history of Soviet gliding.

Forty students were enrolled in the "Gliding Class" from the candidates /60
for the aviation schools in the Main Air Force, the workers in aviation factories, the Moscow School of Military Pilots, and the "Vseobuch" (public schools), but subsequently this number had to be increased, since the influx of those wishing to study gliding was extraordinarily large.

The students studied the history of aviation and gliding, the basic elements in designing gliders for strength, aerodynamics, meteorology, and other disciplines. Lectures were given by V. P. Vetchinkin, V. S. Denisov, S. S. Gromov, myself, and other specialists, and the curricula of the courses and lectures were examined and approved by the Scientific Board of the "Flight Laboratory" under the chairmanship of N. Ye. Zhukovskiy.

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* Nauchnyy arkhiv muzeya N. Ye. Zhukovskogo (Science Archives of the N. Ye. Zhukovskiy museum), Nos., 371, 368/I-368-5.

Studies went along very successfully, and the students were already preparing to start the independent construction of a glider which they had designed, but then the wooden building of the "Aero-Workshop" was demolished for wood, since that year Moscow was without fuel. It is understandable that without rooms for studying and designing gliders the "Aero-Workshop" had to cease its activity.

Despite its short existence, the "Aero-Workshop" was not only the first Soviet nucleus of gliding in our country but also gave the first impetus to the subsequent development in the USSR of mass gliding, whose successes are now rightfully the pride of our people.

The group of former students of the "Gliding Class", from among the flying and engineering personnel of the Moscow School (A. V. Nadashkevich, V. P. Nevdachin,and others), had already in the next year of 1920 decided to continue the work which had been begun and attempted to found a "glider pilots' club" in the Aviation School.* This attempt was not crowned with success, however, since the civil war and devastation forbade sufficiently serious occupation with this matter.

Continuing to popularize ideas of gliding through the journal Vestnik Vozdushnogo Flota (Air Force Herald) (see Nos. 8-9 and 10-11 for 1921), we, relying on experience abroad, again proved that if the USSR needed a powerful Air Force for which hundreds of skilled flying and engineering personnel would be required, it was now necessary to devote serious attention to an immediate and extensive reactivation of gliding. For this purpose it was requisite that such authorized organizations as the Zhukovskiy Central Aero-Hydrodynamic Institute (TsAGI) and the Main Air Force (Glavvozdukhoflot) should urgently deal with this problem.

At that time we advanced the idea of conducting All-Union Gliding Contests /61 and of founding a special "gliding center."

It was probably under the influence of this agitation that V. S. Pyshnov (then a young student, but now an Honored Worker in Science and Engineering), with the help of his comrades, constructed a glider in the Moscow Aviation Technical School -- the Institute of Engineers of the Red Air Force in the same year of 1921. In this glider, Pyshnov, B. I. Cheranovskiy (the future designer of gliders and airplanes of the "flying wing" type), V. V. Utkin-Yegorov, and other members of the group of glider enthusiasts which had been organized in November, 1921, made about twenty catapult and free "hoists" and glides in Annenhof Square. Then the glider was broken up, and not put together again.**

At approximately the same time another group of aviation workers (from among the former students of the "Gliding Class") came to me with the request to help them officially organize a "Glider Enthusiasts" Club in the Aviation School

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* See the letter of K. K. Artseulov. Nauchnyy arkhiv muzeya. N. Ye. Zhukovskogo, No. 107/6.

** See letter of V. S. Pyshnov. Nauchnyy arkhiv muzeya. N. Ye. Zhukovskogo, No. 2210/8.

and to provide the necessary material base for it. The authorities of the Main Air Force decided to found such a glider enthusiasts' club, not in the School of Military Pilots, but for the Scientific Editorial Board of the Air Force. And so on November 10, 1921, the Scientific Board held a meeting of workers and a number of invited individuals (among whom were V. P. Vetchinkin, V. S. Pyshnov, A. V. Nadashkevich, K. K. Artseulov, V. P. Nevdchin, S. S. Gromov and others), at which I gave a report "On the Need for Organizing a Club of Glider Enthusiasts to Popularize the Idea and to Develop Scientific Technical Matters Pertaining to Soaring in the Air."

Our proposal was accepted and on the recommendation of V. P. Vetchinkin, who at that time was fascinated with the study of bird soaring, it was decided to call this club "Soaring Flight". To organize it, the 'triumvirate' of N. D. Anoshchenko, I. A. Valentey, and Yaroshevskiy was chosen.*

The former pilot A. A. Zhabrov was chosen as the first chairman of the glider enthusiasts club "Soaring Flight," and Vs. Garshin was chosen as the secretary.

Thus, in November, 1921 the first Soviet club of glider enthusiasts was born and formed, which was subsequently fated to play a significant role in the mastery in the USSR of the art of making soaring flights and in the popularization of Soviet gliding. /62

For the normal development of Soviet gliding, however, a reliable material base was still requisite which only the scientific and technical organizations of the Air Force could afford.

It may therefore be considered that the development of Soviet gliding was put on solid footing only at the end of 1922, when the gliding enthusiasts began to receive statutory material support from the controlling organs of the Red Air Force, who saw in it a powerful reserve from which could subsequently be drawn skilled reinforcements for the personnel it needed.

The little-known history of this crucial moment in the development of mass Soviet gliding is in short as follows:

In the autumn of 1922, Comrade A. A. Znamenskiy, Chief Commandant of the Air Force of the Republic, read in No. 117 of the foreign newspaper Nakanune (On The Eve) an article about the Rhön contests of German glider enthusiasts and about their remarkable achievements in making soaring flights. Not believing what he had read, he sent the article to the Chairman of the Scientific-Technical Committee of the Main Air Force, Comrade P. S. Dubenskiy, with the inquiry of whether the printed material were true, to which Dubenskiy on September 4, 1922 wrote back:

"There are apparently no exaggerations in the article. N. D. Anoshchenko, whom I have entrusted with making an exhaustive report on this question in the Scientific-Technical Committee, is specially occupied with this subject.

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* Nauchnyy arkhiv muzeya, N. Ye. Zhukovskogo, No. 2213/4.

"Last year N. D. Anoshchenko attempted to organize gliding but was unable to do anything because of lack of means.

"At present the question of gliders is evoking great interest."*

On the same day, I received from Dubenskiy, with the notation "Urgent", the suggestion, "On next Friday to report to the Scientific Technical Committee 'on the state of gliding amongst us and abroad and on the immediate problems and prospects of its development,'" which I did on September 15, 1922, after which the Scientific-Technical Committee passed the following resolution:

"To acknowledge that gliding is deserving of every support on the part of the organs of the Air Force; to designate credits from the funds for experimental construction for the purpose of building the most interesting glider designs; to involve TsAGI, the Scientific-Technical Committee, and other scientific organizations of the Air Force, making it incumbent upon one of the /63
members of the Committee to follow the development of gliding and periodically to report to the Scientific-Technical Committee about it. To create favorable conditions for conducting experiments with gliders."**

Only after this resolution of the Scientific-Technical Committee of the Main Air Force, which was a historic resolution in the fate of our gliding, and in the adoption of which such competent scientist members of the Scientific-Technical Committee as A. N. Tupolev, B. S. Stechkin, N. R. Brilling, N. V. Fomin and others actively participated, did Soviet gliding receive the necessary scientific, material, technical, and legal base for its development.

Thus the work for the restoration of gliding in the USSR which we had begun with the support of N. Ye. Zhukovskiy, as early as 1919, in the "Gliding Class of the Aero-Workshop" was completely acknowledged and supported by the highest scientific center of the Red Air Force -- its Scientific-Technical Committee.

With the founding in 1923 of the Society of Friends of the Air Force (ODVF), with its Sports Section and "Center of Motorless Aviation", clubs of gliding enthusiasts, eager for practical work spontaneously began to appear everywhere. Therefore, it is quite natural that the All-Union Conference of the ODVF held in June, 1923, set before the authorities the problem of uniting the 40-50 spontaneously founded gliding enthusiasts' clubs and of organizing an All-Union Contest for glider pilots."

Thus gradually Soviet gliding was born, and the long expected day for reviewing its achievements was approaching. In view of the lack of experienced glider pilots and of gliders which had already been proven, it was decided to conduct not a contest, but only "Representative Experimental Tests of Soviet Gliders" and to establish a rigorous preliminary check of the strength and reliability of the machine construction, of the skill of their pilots, and of the safety of launches. Under the chairmanship of the TsAGI representative, V. P. Vetchinkin, the composition of the technical Committee was approved, including a representative of Main Air Force inspection.

* Nauchnyy arkhiv muzeya, N. Ye. Zhukovskogo, No. 2213/1.
** Nauchnyy arkhiv muzeya, N. Ye. Zhukovskogo, No. 2213/3.

On August 27, 1923 the ODVF SSSR approved the matter and set up an "Organizing Committee for Arranging the First All-Union Representative Experimental Tests of Motorless Flying Machines in 1923" composed of the chairman of the "Center of Motorless Aviation," K. K. Artseulov; the deputy chairman of the Sports Section and representative of the Main Air Force, N. D. Anoshchenko; /64 a representative from the Zhukovskiy Air Force Academy, V. Ya. Arrison; a representative of TsAGI, V. P. Vetchinkin; and military pilots, Engineer I. N. Vinogradova, A. Ye. Rayevskiy, and others.

And thus it was that 40 years ago, from November 1 to 18, 1923 in the Crimea in the Koktebel' Region on Mt. Uzun-Syrt were held the First All-Union Gliding Tests at the end of which pilot L. A. Yungmeister brilliantly executed the first soaring flights in the USSR. His achievements surpassed foreign records, which permitted V. P. Vetchinkin to write "Russian gliders, constructed in complete independence, without any copying from foreign models, are in no way inferior in their flying qualities to the best foreign soaring planes, while Russian pilots in three weeks achieved the same results as were achieved in Germany only in the third year of gliding contests."*

Such is the brief history of the formation of Soviet gliding which, based on documentary evidence, permits us to state that our gliding, whose cradle was watched over by N. Ye. Zhukovskiy, owes its formation in the USSR and its initial development to participation of such scientific organizations as the "Flight Laboratory" with its scientific Board, and its "Aero-Workshop Gliding Class," the Scientific Technical Committee of the Main Air Force, the Air Force Academy, the TsAGI, etc., under the direction of the Party and the Soviet Government.

Therefore, the beginning of the reactivation of gliding in the USSR must be assigned not to 1923, but to 1919, which also emphasizes the significance given to gliding by the Party and Soviet Power even in those difficult days of universal devastation and civil war.

Finally, in this short sketch, the author also wanted to show in clear outline that historic "relay race of generations" which created the continuity of the ideas underlying the development of gliding in our country -- from Arendt and Zhukovskiy to Tupolev, Yur'yev, Rossinskiy, Vetchinkin, and the author of this article; from them to V. S. Pyshnov, A. S. Yakovlev, S. V. Il'yushin, O. K. Antonov, B. I. Cheranovskiy, and so on to our days, when the new contingent is continuing to aid the development of our aviation science and engineering, utilizing for this purpose the gliding activity whose prehistory and formation in the USSR we have related in the present article.

Works on the History of Aviation and Cosmonautics in the Ukraine

M. A. Kochegura

The section on the History of Aviation and Cosmonautics of the Ukranian /65 Division was organized in February, 1962, when the initiating group of the Aviation Community of the city of Kiev -- aviation veterans and enthusiasts of

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* Pervyye opyty pareniya v SSSR (First Soaring Experiments in the USSR). Moscow, p. 87, 1924.

aviation history -- gathered in their first session, choosing the Organizational Committee comprised of eight people. From the first days of the activity of the Organizational Committee, its sessions, along with organizational matters, heard and discussed reports and communications on the history of aviation in the Ukraine. The members of the Organizational Committee took an active part in the organization and conducted a festive meeting dedicated to the 75th anniversary of the birth of the founder of aerobatics -- the military pilot P. N. Nesterov -- and discussed and reviewed the scenario of the moving picture Mërtraya petlya (Looping the Loop).

The first organizational meeting of the members of the Section took place on April 16, 1962. At this meeting general problems and the work of the Section were discussed, and a Board consisting of five people was chosen. The main problem of the Section in the coming years is to collect materials for compiling and publishing, by the 50th anniversary of the Great October Socialist Revolution, a work on the history of aviation in the Ukraine in the form of essays or a monograph. In addition to the history of aviation, this book should contain sections on the history of aeronautics and of rocket engineering.

The Section also set itself the task of uniting historians of aviation living in the Ukraine and of collecting materials on the history of aviation in the possession of veterans and other individuals. By the end of 1962 this Section counted more than 30 members, including about 10 from other cities of the Ukranian SSR - Khar'kov, Odessa, Vinnitsa, L'vov, Lutsk, and Sevastopol'. The membership of the society has at present become stabilized at approximately the same number. Some of them have left and some have been duly accepted. The new entries participate in the meetings of the Section members.

Meetings of the members of this Section are proceeding very actively. The /66
main question in almost every meeting is the production of a book on the history of aviation. The publication of such a book has been approved and supported by the First Secretary of the Central Committee of the Communist Party of the Ukraine, Comrade P. Ye. Shelest, and the Chairman of the State Committee on Coordination of Scientific Research Work in the Ukrainian SSR, A. N. Shcharban', Member of the Academy of Sciences UkSSR. At present, the prospectus of the book on aviation history in the Ukraine has been sent for examination to the Gostekhizdat (State Publishing House for Technical Material), of the Ukrainian SSR. Reports on the work of the individual Section members on portions of the book on aviation history in the Ukraine are regularly heard at sessions of the Board and meetings of the Section members.

At sessions of the Board and general meetings of the members of the Section, in accord with the plan made for each half year, reports, communications, and reminiscences of aviation veterans, remarkable data on the history of aviation science and technology, and so on are presented and discussed. Before the presentation of any report to the Section, a short résumé of it is set forth by the reporter at a session of the Board, no later than a week before the Section meeting. After discussion of the contents of the report, the Board usually recommends that certain of its sections be developed and that the uninteresting elements be curtailed. Thus the Board can actively influence the quality of the report, while its author has enough time to ponder the remarks, proposals, and recommendations expressed in the Board.

Among the reports and communications heard at sessions of the Board and of the Section, are the following:

Zamlinskiy, V. A. (Lutsk) - New Data on the Biography of One of the Pioneers of Cosmonautics, Yu. V. Kondratyuk.

Koroleva, Ye. V. -- The First Military Flights of Russian Pilots (On the 50th Anniversary of the Balkan-Turkish War).

Kochegura, M. A. -- The Works of Yu. V. Kondratyuk.

Laponogov, I. S. -- The Location of the Syrets Airport, Above Which P. N. Nesterov Looped the Loop.

Lyakhovetskiy, M. B. -- The Twentieth Anniversary of the Day of the First Jet Airplane Flight in the USSR.

Lyakhovetskiy, M. B. -- Flights to the North Pole.

Lyakhovetskiy, M. B. -- First Flights Across the North Pole to the USA.

Lyakhovetskiy, M. B. -- The Fortieth Anniversary of Main Air Force (GVF).

Lyakhovetskiy, M. B. -- The Pilot E. Kruten.

Ivashchenko, V. I. -- N. Kibal'chich and His Relatives Who Have Lived and Are Living in the Ukraine and in Other Republics of the Soviet Union.

Bondarenko, S. S. -- The First Repair Bases and Plants for Maintaining Airplanes in the City of Kiev. /67

Kochegura, M. A. -- V. A. Zamlinskiy's Manuscript "The Astronaut from Lutsk."

Sobolev, S. A. (Vinnitsa) -- On His Manuscript "A. F. Mozhayskiy in the Ukraine."

Suleymanov, M. Z. -- Fifteen Years' Operation of the AN-2 Airplane.

Kochegura, M. A. -- The Fiftieth Anniversary of the First Airplane Russkiy Vityaz' (Russian Hero).

Karatsuba, S. I. -- On the Work of the Gliding Club of Kiev Polytechnic Institute in the Twenties.

Koroleva, Ye. V. -- Fiftieth Anniversary of P. N. Nesterov's Loop.

Lyakhovetskiy, M. B. -- The Fortieth Anniversary of the Society of Aviation and Aeronautics of the Ukraine and the Crimea (OAVUK).

Rudnitskiy, Ya. R. -- The Celebration of the Fortieth Anniversary of Gliding in Kiev.

In addition, questions of memorializing the memory of the glider pilot, G. S. Tereverko and of the military pilot P. N. Nesterov were discussed. In response to a petition by the Section, the name of G. S. Tereverko was given to a street in the city of Tbilisi. Kiev architects are developing a project for the memorial to P. N. Nesterov which will be erected in the city of Kiev at the intersection of Brest-Litovsk Highway and P. N. Nesterov Street.

The Section also heard a report on communication with foreign libraries on questions of the history of aviation and on sessions of the Aviation Section of the Soviet National Society of Historians of Natural Science and Technology (Moscow) which were attended by members of our Sections. At one of the meetings of the Section part of Ye. V. Koroleva's manuscript "Biographical Study of the Pilot M. Yefimov" was discussed.

Since the day the Section was organized, the following works by its members have been published on the history of aviation in the Ukraine:

Lyakhovetskiy, M. B. -- Talanovytyy Ukrayins'kyy umilets'. Narysy istoriyi npyrodoznavstva i tekhniky (A Talented Ukrainian Specialist. Sketches of the History of Natural Science and Technology). Number 3, Vydavnytstvo Akademiyi nauk, UkSSR, 1963.

Lyakhovetskiy, M. B. -- V ogne srazheniy. 40 let Grazhdanskogo vozdushnogo flota. Sbornik statey. (In the Fire of Battle. Forty Years of the Civil Air Fleet, a Collection of Articles). Redizdat Aeroflota, 1963.

Lyakhovetskiy, M. B. -- Nadezhnyye kryl'ya respubliki (The Republic's Trustworthy Wings). Izdatel'stvo "Znaniye." Kiev, 1962.

Zamlins'kiy, V. O. -- Vin npokladav shlyakh u vsesvit (Pro odnogo z pioneryv radyans'koy astronavtiky. Yu. V. Kondratyuk (He Blazed the Trail to the Universe. One of the Pioneers of Soviet Astronautics, Yu.V. Kondratyuk). Vydavnytstvo "Znaniya," Kiev, 1963.

Zamlins'kiy, V. O. --Avstronavt (The Astronaut). Vydavnytstvo "Kamenyar," L'vov, 1964. /68

Moreover, in various newspapers and periodicals about 70 articles were published.

The following works on the history of aviation were prepared and sent to press:

Koroleva, Ye. V. -- They Were the First to Stride to Heaven (The First Russian Aviators).

Koroleva, Ye. V. -- A Sketch of New Documents from the Biography of the Pilot M. Efimov.

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